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E-pocket book media PBL-based for problem solving ability and student learning motivation

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ABSTRACT

This study is based on students' inability to solve problems in psychotropic material, which is caused by students' low reasoning power and tendency to memorize the material. To address these issues, consider using PBL-based e-pocket book media used for this study. The purpose of this study is to develop e-pocket book media based on PBL that are feasible, practical, and effective in improving students' problem-solving skills and motivating them to learn. The research was conducted in November 2022 - May 2023. The RnD research method was used in conjunction with the ADDIE development design. Interview guidelines, learning observations, expert assessment sheets, teacher and student response questionnaires, and student motivation questionnaires in learning were used to assess learning. The qualitative data analysis was obtained from media and material expert advice, teacher and student response questionnaires, student motivation questionnaires, learning observations, and interviews. The validation result of media experts yielded a quantitative 96% very feasible category while material expert validation yielded a 92% very feasible category. The results of the teacher's response questionnaire were 91%, while the student response was 89% in the very practical category. A questionnaire on student motivation in learning after using e-pocket book media was also obtained by 86%. Furthermore, the results of the independent sample t-test, show the result where Tcount> Ttable. It can be concluded that PBL-based e-pocket book media is very feasible and practical to use in learning and can improve students' problem-solving abilities on psychotropic material and motivate students in learning.

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Keywords
E-pocket book, Problem-solving skills, Problem-based-learning, Psychotropics.

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INTRODUCTION

Advances in science and technology have brought rapid changes, especially in the field of education. Advances in science and technology also provide changes for students to adapt to the times in the 21st century. The evolution of the 21st century encourages students to have a wide range of abilities. One of these abilities is the ability of students to solve problems. The ability to solve problems is an essential ability needed by students, because the ability to solve problems can help students make decisions that are precise, careful, systematic, and logical, and can consider things from various points of view (Calado et al., 2018). The ability to solve problems can improve other abilities, such as searching, selecting, evaluating, organizing, and considering various alternative problems given to students. However, the ability to solve problems cannot be owned by students

directly. One of the factors that can support improving the ability to solve problems is the selection of the right learning model (Widjaja *et al*., 2017; Zubaidah *et al*., 2017).

One of the right learning models is the PBL-based learning model. PBL-based learning model is a learning model that emphasizes a problem. This learning process becomes more meaningful and contextual (Kamsin *et al*., 2022; Maulidya *et al*., 2021; Virranmäki *et al*., 2021). The results of research conducted by Priadi *et al*., (2016) stated that PBL-based learning models can improve students in solving problems and developing student competence in learning. The development of student competence can be assisted by learning media. Learning media serves as an intermediary in the learning process. The presence of learning media can bring and arouse students' enthusiasm for learning (Wati, 2016). Print and electronic learning media are included in learning media. Electronic learning media can increase the effectiveness of teaching and learning activities (KBM) in the classroom and make it easier for teachers to deliver material when teaching (Audia *et al*., 2021).

E-pocket book media is one of the learning media that can improve students' problem-solving skills. The advantages of e-pocket book media are easy to use, interactive, and informative. In addition, e-pocket book media can support student understanding, provide an interesting learning atmosphere, and be able to improve problem-solving skills. The e-pocket book presented a variety of interesting features, thus fostering students' desire to learn and improve the learning skills of the students. Besides, the additional features that can improve students' problem-solving skills are quizzes, case studies, interesting facts, biology concepts, you need to know, news info, and discussion corners. The material presented in this e-pocket book media is more concise and interactive, so students can more quickly understand the material (Mardiyanti *et al*., 2020).

Based on the results of interviews conducted with biology teachers at SMA Negeri 7 Bogor City, students' problem-solving skills on psychotropic material are low. The reason for students' inadequate problem-solving ability is their limited reasoning capacity and knowledge (Yusnaeni et al., 2017). The ability to solve problems is closely related to the critical thinking skills that students must have in learning (Agnesa & Rahmadana, 2022; Andreou, 2020). In addition, learning resources and learning media used have not been supported, thus making students bored while learning in class and reducing student motivation in learning. Consequently, in contrast to the described urgency, the objective of this research endeavor is to create e-pocket book media based on problem-based learning that is practical, effective, and feasible in enhancing students' problem-solving abilities regarding psychotropic subjects while also inspiring students to learn. The urgency of this research is related to the development of a pocketbook based on the PBL model which can be used to improve problem-solving abilities and motivation. This is urgent because the ability to solve problems is very important for students to be able to compete globally.

METHOD

The research was carried out at Senior High School (SMA) state 7 Bogor City. The research was conducted during the even semester of the 2023/2024 academic year, from November 2022 to June 2023. A total of 205 students in the XI grade who were majoring in Mathematics and Natural Sciences comprised the population for this study. A total of 63 students in the XI MIPA 1 and XI MIPA 3

comprised the samples for this study. XI MIPA 1 class served as the experimental class and XI MIPA 3 class served as the control class. Purposive sampling was the method of sampling used. The methodology of this study is Research and Development (R&D).

The development design uses the ADDIE development model which consists of 5 stages: analysis, design, development, implementation, and evaluation. At the analysis stage, the characteristics of students are analyzed externally and internally, analyzing the curriculum, models, media, methods, and evaluation of learning and analyzing teaching materials about psychotropic drugs. Furthermore, the design stage is designing e-pocket book media with *Canva* and *Smart Apps Creator* applications. The development stage is carried out validation by material experts and media experts to determine the feasibility of content, presentation feasibility, graphics feasibility, and language feasibility. At the implementation stage, namely applying the e-pocket book product, this aims to determine the shortcomings and advantages of the product. The last stage is evaluation, which aims to determine the feasibility, effectiveness, and practicality of e-pocket book media that has been tested, and determine student learning motivation after using e-pocket book media.

The data analysis techniques used are feasibility analysis and practicality analysis of e-pocket book media. Learning media is categorized as feasible and practical if the test results are above the standard score (Deschryver, 2017). In addition, to determine the effectiveness of the use of e-pocket book media which is analyzed using the independent sample t-test formula. The effectiveness test aims to determine statistically significant differences between experimental and control groups, but the data must be normally distributed and homogeneous. Then a student learning motivation questionnaire was distributed which aims to determine the achievement of student learning outcomes after using the e-pocket book media.

RESULTS AND DISCUSSION

The E-pocket book media development process on psychotropic material is developed with the ADDIE development model, which consists of Analysis, Design, Development, Implementation, and Evaluation. The analysis is the first stage of the ADDIE development method. At this stage, interviews were conducted with biology teachers and preliminary. The results show that the preliminary tests indicated that 64% of students have difficulty in solving problems on psychotropic material. Design is the second stage, in this stage, the design of making learning media is carried out. This e-pocket book media is designed with the *Canva* application and Smart Apps Creator software. The third stage is development, this stage includes validation carried out by media experts. Media experts an experts who aim to find out the shortcomings of e-pocket book media and improve from comments or suggestions from experts. The following are the scores obtained from the validation of media experts and material experts. The characteristic of the media developed is that it is related to the topic discussed and is based on the concept of problem solving which is based on the problem-based learning model. The media developed is under the standards of competencies that students must possess.

The objective of e-pocket book media feasibility analysis is to determine the product feasibility of the development. Validation of the media was carried out three times. Table 1 shows the results of the media validation score.

Table 1. Media validation score

Media Validator Assessment	Score	Percentage	Criteria
Assessment I	155.00	88.00%	Very feasible
Assessment II	162.00	92.00%	Very feasible
Assessment III	169.00	96.00%	Very feasible

From Table 1, based on the results of media validation, the e-pocket book media that has been validated by media experts is categorized as very feasible to be tested on students, because it has been assessed three times with a final assessment result of 96%. The e-pocket book media can functionally encourage students to learn. The e-pocket book media is presented with a variety of menu options, so students have no difficulty in understanding the material to be studied. In addition, the size of the e-pocket book media, layout arrangement, videos, images, font size, font type, and color are proportional. The e-pocket book media has a width of 1,024 pixels and a height of 1,600 pixels. This size follows the scale proposition of the cellphone monitor. The font type and size have a clear, attractive, and comfortable shape and size to read. In addition, the selection of colors in making e-pocket book media is dominated by blue which symbolizes the impression of imagination and inspiration (Sidabutar & Reflina, 2022).

The content in the e-pocket book media is effective because the media developed is interactive, contains the latest information, and is visually or audibly attractive, thus encouraging students' attention to learn more deeply. Effective learning media is learning media that involves visuals and audio and can be easily understood by students while learning (Mashfufah *et al*., 2019). The e-pocket book media is prepared with good and correct Indonesian or English language rules. Foreign words are italicized so that students know the scientific names in the media. This is following the requirements of learning media which include readability, clarity of information, and suitability of good and correct language rules so as not to cause double or ambiguous meaning. (Azizah *et al*., 2022).

Material validation of the e-pocket book media aims to determine the suitability of the material made with the learning objectives that must be achieved by students. This material validation was carried out twice. The following is the acquisition of material validation scores

Table 2. Material validation score

Material Validator Assessment	Score	Percentage	Criteria
Assessment I	97.00	74.00%	Worth
Assessment II	119.00	92.00%	Very feasible

The material validation results consist of aspects of presentation feasibility and content feasibility. Aspects of presentation feasibility and content feasibility discuss the suitability of psychotropic material with standard competition numbers 3.11 and 4.11. Psychotropic material is very important to learn because the use of psychotropic drugs is directly related to the human body system. (Ozturk & Turkyilmaz, 2017). The material in the media is following up-to-date facts and theories. In addition, the psychotropic material is presented systematically and sequentially, so that it can help students in understanding the content of the material in depth. The psychotropic material in the e-

pocket book media encourages students to be able to explore and be able to solve problems. The e-pocket book media features "Quiz", "Case Study", "Interesting Facts", "Biological Concepts", "You Need to Know", "News Info", and "Discussion Corner". According to Agnesa dan Rahmadana (2022), The presentation of various features in learning media can stimulate students to think at a high level and critically in solving problems and students are motivated and active in participating in learning activities in class. One of the features that attracts students' attention is the quiz feature. This quiz feature can increase students' motivation to learn. (Chandrawan *et al*., 2023).

The fourth stage is implementation, at this stage, the e-pocket book media that has been developed is implemented by students. Testing of e-pocket book media is done with a limited scale test. XI MIPA 1 class was used as an experimental class using e-pocket book media, while XI MIPA 3 class was used as a control class not using e-pocket book media. The e-pocket book media testing used a quasi-experimental non-equivalent control group design with an instrument of problem-solving ability in the form of essay questions. The results of the e-pocket book media testing are presented in tabular form as follows:

Table 3. The results of the calculation of N-Gain values in the experimental class

Implementation Criteria	*Pre Test*	*Post Test*	N-gain
Minimum Value	10.00	60.00	
Maximum Value	55.00	93.00	0,71
Average	32.21	80.59	
Criteria			High

Table 4. The results of the calculation of N-Gain values in the control class

Implementation Criteria	*Pre Test*	*Post Test*	N-gain
Minimum Value	10.00	20.00	
Maximum Value	40.00	80.00	0,42
Average	19.74	51.98	
Criteria			Medium

The calculation of the N-gain test in the experimental class obtained an N-gain score of 0.71 with high criteria. While in the control class, the calculation of the N-gain score was 0.42 with moderate criteria. After that, the statistical test was continued. Before beginning the process, statistical tests, specifically the normality and homogeneity tests must be performed first. the calculation was conducted using SPPS 20.0 for Windows software. The normality test aims to determine whether the data that has been collected is normally or abnormally distributed. If the Sig value. > 0.05, then the data is normally distributed. The normality test uses the Kolmogorov-Smirnov formula. The calculation results are obtained shown in Table 5.

Table 5. Normality test calculation results

Class	Sig. Level	Significance	Conclusion
Experiment Control	0.05	0.674	Normal

The homogeneity test aims to determine the similarity of each data group. The homogeneity test uses the Levene test formula. The calculation results were obtained as follows:

Table 6. Homogeneity test calculation results

Class	Sig. Level	Significance	Conclusion
Experiment & Control	0.05	0.405	homogeneous

The independent sample t-test analysis aims to determine the significant difference between students who use e-pocket book media and students who use conventional media.

Table 7. Independent sample t-test results

Class	T Table	T Count	Sig. (2-tailed)
Experiment & control	0.678	5.205	0.000

The results of the normality test showed a significance value of 0.674. If the significance value> 0.05, it can be concluded that the data in this study follow a normal distribution. The homogeneity test obtained a significance value of 0.405. If the significance value> 0.05 then the data in this study is homogeneous. The T-test result is 5.205 with Sig. (2-tailed) of 0.000. If the value of Sig. (2-tailed) <0.05, it can be concluded that there is a significant difference between classes that use e-pocket book media and classes that use conventional media. The fifth stage is evaluation by distributing teacher response questionnaires, and student, and student motivation questionnaires after using e-pocket book media. The following e-pocket book media practicality results are presented in tabular form:

Table 8. Teacher response questionnaire results

No	Indicators	Indicator Statement	Item Score	Result Maximum	Score (%)
1.	Display of psychotropic e-pocket book media	1-5	23	25	92
2.	Suitability Completeness psychotropic e-pocket book media components	6-9	19	20	95
3.	Suitability with contextual aspects of psychotropic drugs	10-12	14	15	91
4.	Ease of using psychotropic e-pocket book media	13-17	23	25	91
5.	Appropriateness of images and illustrations	18-20	13	15	87
	Average Percentage				91

Table 8 shows the teacher response questionnaire yielded that the overall percentage value is 91%. The second indicator, which assessed the completeness of the psychotropic e-pocket book media component received the highest percentage of 95%. This indicates that the teacher agreed that the e-pocket book media was highly practical to use in learning and very feasible to disseminate at school. This is reinforced by the results of research conducted by Putri dan Lestari (2021) stated that e-pocket book media is very practical to use as a learning supplement because it has met the criteria of practicality, namely ease of use and efficiency of learning time. Thus the e-pocket book media has a positive response from teachers because the developed e-pocket book media facilitates and helps teachers in the teaching process within the classroom.

Based on Table 9, shows the results of the student response questionnaire, the overall percentage value obtained is 89%. The highest percentage was obtained in the third indicator, the completeness of the psychotropic e-pocket book component of 93%. Therefore, e-pocket book media facilitates independent student learning and can improve students' ability to solve problems (Saphira,

2023). Mamat *et al*., (2022) stated that e-pocket book media serves to support the learning process that can increase academic motivation, literacy skills, and student achievement in learning. Therefore, e-pocket book media can improve students' problem-solving skills and have a positive response from students, because the developed e-pocket book media presents a variety of interesting features and can improve problem-solving skills.

Table 9. Student response questionnaire results

No	Indicator	Indicator Statement	Item Score	Result Maximum	Score (%)
1.	Display of psychotropic e-pocket book media	1-5	23	25	92
2.	Readability of psychotropic e-pocket book	6-9	17	20	85
3.	Completeness of psychotropic e-pocket book components	10-12	14	15	93
4.	Benefits of a psychotropic e-pocket book in supporting lessons	13-20	35	40	87
	Average Percentage				89

Table 10. Results of the student motivation questionnaire

No	Indicators	Indicator Statement	Score (%)
1	Diligent in learning	14,16,17,27,30	88
2	Self-confidence	12,22,25,26	84
3	Desire to learn independently	2,4,7,8,11,13,15,18,19,24,28	85
4	Student learning process activities	1,3,6,9,20,21	86
5	Cold achievements achieved by students	5,10,23,25,29	86
	Average		86

The questionnaire analysis of student learning motivation after using the e-pocket book media was 66%. The developed e-pocket book media can increase students' perseverance in learning by 88%, increase student confidence by 84%, increase students' desire to learn independently by 85%, increase student learning process activities by 86%, and increase student achievement by 86%. The percentage increase can affect student learning motivation. Student learning motivation is influenced by many factors, one of which is e-pocket book media. The e-pocket book media developed combines elements of technology to improve the quality of student learning (Pratama *et al*., 2019). Quality learning refers to an educational experience that captivates students and has the potential to positively transform their personalities (Adnan *et al*., 2019; Chen *et al*., 2022; Siddiq & Scherer, 2019).

CONCLUSION

Based on the results of the study and development of PBL-based e-pocket book media, it can be concluded that this media is very feasible to use in the learning process in the classroom. This has been proven by the results of the media feasibility test, obtained from the media expert validation results with a very feasible category, and the material validation test results with a very feasible category. In addition, the results of the teacher's and students' responses get a very practical category, student learning motivation questionnaires using e-pocket book showed the results of the t-test calculation, that t count> t table. This can be interpreted as indicating that PBL-based e-pocket book media has a significant influence in improving students' problem-solving skills with psychotropic materials. For further research suggestions, additional various media can be developed

such as websites, Android applications, animated videos, and electronic books based on popular learning models such as project-based learning, problem-based learning, and discovery learning.

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